

## **Historic, archived document**

Do not assume content reflects current scientific knowledge, policies, or practices.

Ag84 F  
#1838  
Rev 51  
Cop 2

# ELECTRIC LIGHT FOR THE FARMSTEAD



FARMERS' BULLETIN No. 1838

U. S. DEPARTMENT OF AGRICULTURE

# Contents

	<i>Page</i>
What is good light? . . . . .	3
Two sources of electric light . . . . .	6
Wiring for good lighting . . . . .	9
Lighting the farmhouse . . . . .	11
Fixtures for general lighting . . . . .	11
Portable lamps . . . . .	17
Night lights . . . . .	23
How to plan for good lighting . . . . .	23
How to improve your lighting . . . . .	28
Keeping lamps and fixtures at their best . . . . .	28
Lighting the farmyard and buildings . . . . .	30
Yard lighting . . . . .	30
Light in farm buildings . . . . .	32
Care and upkeep . . . . .	43
Special lamps for special purposes . . . . .	44
Bactericidal lamps . . . . .	44
Sunlamps . . . . .	45
Heat lamps . . . . .	46
Lamps to attract insects . . . . .	46

---

This publication was prepared by the Bureau of Human Nutrition and Home Economics and the Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture, with the cooperation of rural lighting specialists of the Extension Service, Rural Electrification Administration, and several public utilities and electrical equipment manufacturers. It is a thorough revision of an earlier publication by the same title, issued in 1940, and prepared by the U. S. Department of Agriculture with the cooperation of the Committee on Rural Lighting of the Illuminating Engineering Society.

---

Washington, D. C.

Issued 1940—Revised November 1951

---

For sale by the Superintendent of Documents, U. S. Government Printing Office  
Washington 25, D. C. - Price 15 cents

# Electric Light

## for the farmstead

By Elizabeth Beveridge<sup>1</sup> and Albert V. Krewatch<sup>2</sup>

If you have ever seen electricity come to the farm for the first time, you know what immediate convenience and enjoyment even a few electric bulbs bring. But that is only the beginning. Good lighting can do far more—and it is up to you to see that you are getting full value from your investment in the lighting of your farm.

Think of your family's health and safety. A well-lighted home is easier to keep clean and there is less danger of accidents. Good lighting helps keep eyes strong and healthy—often saves nervousness and irritability by preventing eyestrain.

Or consider good light on the basis of farm income. With it you can do much of your work better and more easily. You can spread work over more hours and do some jobs when they need to be done without waiting for daylight. Perhaps you can use light to increase quantity or improve quality of farm production—by lighting the hen house in winter, or by lighting the milk house so that you will be better able to maintain the cleanliness necessary to produce high-grade milk.

### What is good light?

**Good light is enough light.** The amount of light you need depends on what you are doing. As you walk through the house or yard you need only enough to enable you to move freely and safely. It takes twice that much light to eat a meal comfortably, find a tool in the shop, or for children at active play. When you press a blouse, comb your hair at a mirror, leaf through a magazine, or tighten a bolt in the shop the amount of light needed has again doubled.

Then there are jobs that demand more accurate sight, often for a longer time, and take many times as much light as walking through the house—kitchen work, ordinary sewing, reading, studying, shaving, or repairing machinery. Jobs that take the most light of all are fine needlework, sewing dark materials with matching thread, or reading fine print.

<sup>1</sup> Housing specialist with the Bureau of Human Nutrition and Home Economics.

<sup>2</sup> Agricultural engineer from Maryland Agricultural Extension Service, in cooperation with Division of Farm Electrification, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture.





A light meter is used to show whether there is light enough to make work clearly visible. The meter is held in the same position as the work that must be seen; in this picture the job is wool embroidery.

In any one location—the house, farm building, or yard—you may need a small amount of light at one time, a large amount at another. The important thing is to see that there is available at each place enough light for the most exacting work to be done there.

With well-planned lighting, you can turn on only part of the light when it is not all needed.

Eyes are so used to working in poor light that they are not the best judges of the amount they need. The only way to measure light accurately is to use a light meter. It shows amounts needed for different tasks and whether the light at any point is adequate. Inquire in your community for someone who has a light meter and can measure your light and suggest ways to improve present lighting or to plan new. Some possible sources of such help are electrical dealers, power suppliers, and home demonstration agents.

**Good light is comfortable, free from glare.** It is always uncomfortable to look at a lighted bulb or tube, though fluorescent tubes aren't as glaring as incandescent bulbs and frosted bulbs are better than the older clear-glass ones. Glare from a very bright bulb or tube can be almost blinding. Even a small part of one showing below a lamp shade hurts the eyes. Those close to the ceiling are less annoying than those lower down where you must look at them often, but even the high ones are better if shielded in some way. This is especially true in bedrooms where a person lying down may look directly at the light fixture.

Light reflected from a shiny surface is glaring too. Bright metal, glass, polished furniture, glossy paper, and shiny paint all give back sharp reflections. Dull-finished surfaces break up the reflections and so reduce or eliminate the glare. The reflection of an unshaded bulb on a shiny surface is particularly troublesome.



**Good light puts shadows in their place.** Shadows can make seeing difficult by reducing the amount of light on what you are looking at. Too often it is your own shadow that gets in your way. Good light does not eliminate shadows in a room; it simply keeps them off your work. Placing lamps and light fixtures in the right relation to the work puts shadows in harmless locations. A central room fixture needs to be supplemented by sources of light at each place around the sides of the room where work is to be done. The kitchen is a good example—if there is only a central fixture you are constantly blocking your own light when you work at the sink, range, or counters.

**Good light is even, never spotty.** Sharp contrasts of light and dark are tiring because the eyes must adjust constantly from light to dark. A single bright lamp in a room forms a glaring pool of light, especially if the lamp has a solid shade or shield that lets no light through to brighten the surrounding area. Though the amount of light needed for a job such as sewing, reading, or shop repair can best be supplied by a well-placed lamp or fixture, there should always be some light in the rest of the room too. Quite a little light is needed in a room in which television is being viewed, to reduce the contrast of the bright screen.

The gooseneck lamp, used alone, makes a sharp spot of light on the desk, but leaves all the rest of the room in gloom. If it is a little too high the bulb glares in the user's eyes; if too low the lighted area is too small for the work.



With a good pin-to-wall lamp the lighted area is larger, deep shadows are gone, the student is at ease.

## Two sources of electric light

Both incandescent and fluorescent light are used for general and local lighting in houses and farm buildings. Fixtures using incandescent bulbs are more varied in shape than those using fluorescent tubes. Light from a fluorescent fixture is especially good where you need a long line of light or a large amount of light over a rather large working area.

Incandescent and fluorescent light can be used in the same room. Since fixtures for the two are different, decide beforehand which type will be best at each spot where lighting is to be installed.

**Incandescent.** This is the most familiar type of light. It is produced by passing electricity through a filament of tungsten enclosed in a glass bulb. The tungsten gets hot and gives off light that is yellowish white in color. Incandescent bulbs may be used on either alternating or direct current.

Bulbs in most general use are inside-frosted. A newer type has an inside coating that makes the glass look milk white and gives a softer light. Clear glass bulbs are not so good—they are more glaring.

Silvered-bowl bulbs reflect their light toward the screw base of the bulb. "Daylight blue" bulbs are useful where the color of their light is especially desirable—for instance, in the laundry to show up scorch or stains. Since the color cuts down on the amount of light, higher wattage bulbs are needed. Other colored bulbs are suitable only for decorative purposes.

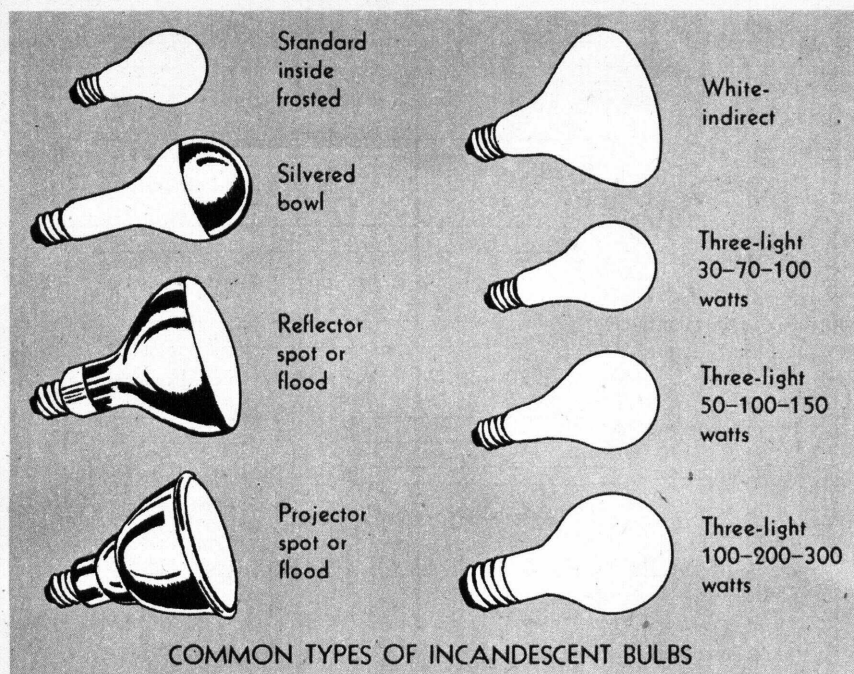
A reflector spot or flood lamp has a built-in reflector to deliver light in a definite direction. It is larger in diameter than most bulbs used in the home or on the farm and is flattened at the bowl end. For outdoor use there are bulbs of similar shape made of hard glass and called projector bulbs.

A bulb known as a white indirect light is shaped like the reflector bulb and has the milk-white inside coating. Because the coating on the sides is heavier than on the flattened end, the bulb can be used without a diffusing bowl.

A three-light bulb has two filaments which can be used separately or together to give three different amounts of light. These bulbs require special three-light sockets.

Most bulbs in common use have a standard-sized medium screw base; bulbs of different wattage can be used in the same socket. Three-light bulbs of the 100–200–300-watt size, some of those of 50–100–150-watt size, and regular bulbs of more than 300-watts have a large base known as a "mogul" base. Christmas tree and other special bulbs have small-sized bases.





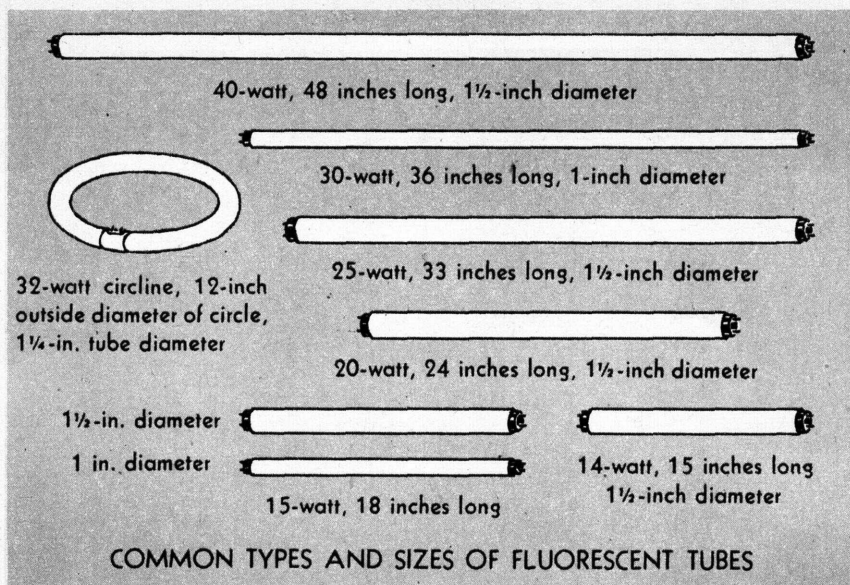
Bulbs are stamped on the bowl end with the voltage, wattage, and symbol of the manufacturer. Look for the symbol of a manufacturer you know to be reliable. Make sure that the voltage shown on the bulb is the same as that of your electric system. Your electric company or cooperative will tell you what this is.

Higher wattage bulbs supply light more economically than those of low wattage; a 100-watt bulb gives about the same light as two 60's or six 25's. There are some places where it may be better to use several smaller bulbs in order to have a better spread of light.

**Fluorescent.** Fluorescent light is easily recognized by the tubes that produce it. In these tubes invisible ultraviolet rays fall on a special inside coating and cause it to give off light. Fluorescent tubes give off less heat than incandescent bulbs.

Most fluorescent fixtures are a little more expensive than good incandescent ones and the tubes cost more than bulbs. To offset this cost, fluorescent tubes produce at least three times as much light per watt as incandescent bulbs and last several times as long. Light from the first fluorescent tubes was bluish in contrast to the familiar yellowish white of incandescent light. Since then other colors have been developed that are more like the incandescent and more flattering to complexions and home furnishings. Those best suited to home use are described on the following page.





NAME OF TUBE	COLOR CHARACTERISTICS
Standard cool white or 4500° white	Bluish-white light. Often preferred in the laundry to show up spots and scorch.
White	A good general purpose white light for kitchens, workrooms, basements.
Standard warm white	The most efficient fluorescent, most like incandescent. Emphasizes green, yellow, and orange colors. For use where amount of light is more important than appearance of complexions.
Deluxe cool white, deluxe warm white, soft white	Less light per watt than the others but kinder to complexions and more pleasing with most room color schemes. Deluxe cool blends best with daylight, deluxe warm with incandescent. Soft white is the most efficient of these three.

Tubes in common use are 15 to 48 inches long; the wattage varies with the length. There are also some longer tubes—a few as long as 96 inches—and there are circular tubes too, which are called “circline.” Because tubes of different wattages are also of different lengths they are not interchangeable as are most incandescent bulbs. It is most important to choose in the first place the fluorescent fixtures that use tubes of sizes to give the right amount of light.

Fluorescent tubes do not operate satisfactorily at voltages below 100. If they are to be used on direct current, special auxiliary equipment must be installed in the circuit.

Almost every fluorescent fixture has a starter, which is often shaped like a little flashlight battery. A long delay in the lighting of the tubes may be due to a worn-out starter that should be replaced. A delay of a few seconds in lighting is normal to most fluorescents. Special instant starting tubes and fixtures can be had at a somewhat greater cost. Starters are not required for these. "Slimline" tubes are of the instant-start type.

Every fixture also has a ballast, hidden in the metal frame. If an objectionable humming sound develops in a fluorescent fixture the ballast may need to be remounted or perhaps replaced.

When a tube blinks on and off it is time to replace it with a new one. Flickering of the tube damages starter and ballast. A "no-blink" starter prevents such flickering by cutting off the current to the tube when it has reached the end of its normal life.

To reduce the possibility of radio interference many new fluorescent fixtures have condensers built into the starters. Before buying a plug-in fluorescent lamp ask to try it out in your home to find out whether it interferes with your radio. If you are already having trouble try locating the radio or lead-in wire and the fluorescent unit at least 10 feet apart. A radio interference filter installed on the fixture or on the radio will further reduce the difficulty.

## Wiring for good lighting

If your farm is to be electrified soon you need to make plans for the best use of the new service. Or perhaps you have electricity now but have already said, "If I were starting over again——." In that case you may want to extend or improve your lighting installation before long and will also need to plan.

It takes a system of wires to deliver electricity to all the places you want it. Skimping wiring is usually false economy. As you find more and more uses for electricity, poor wiring will handicap you at every turn. Overloaded wiring usually causes a drop in voltage. This means that your lights will be dimmer than they should be and fluorescent tubes will not operate satisfactorily. Poor wiring may also lead to the use of makeshift extension devices, which can be fire hazards. In planning—or replanning—your wiring be sure to provide for enough electric capacity to take care of growing needs.

You can get bulletins on farm and home wiring from most agricultural colleges, suppliers of electric service, and manufacturers of wiring materials. These will help you work out your plans.

Have wiring done by a reputable contractor who knows farm needs and will use wire of sizes large enough to keep the voltage drop to less than 3 percent of line voltage. Be sure that the wiring conforms with the National Electrical Code and with State and local regulations and that materials used have the approval of the Underwriters' Laboratories. Having the wiring done right in the beginning pays off both in efficiency and safety.

This bulletin deals with wiring only as it is needed to provide for lighting. However, in actual practice the wiring for all farm needs should be planned and provided at the same time.

**In the house.** Put in all needed wiring and lighting fixtures (or at least connections for the fixtures) in the beginning—to avoid having to break into walls later. Portable lamps can be added at any time if outlets for them are provided.

Outlets for lamps will be used too for radios, clocks, fans, heating pads, electric bed covers, sewing machine, vacuum cleaner. (Higher wattage appliances such as toasters and irons, should not be used on lighting circuits.) Have enough outlets so you won't have to use extension cords or multiple plugs. Try to have outlets that can be reached without moving heavy furniture. In rooms where you use a vacuum cleaner, an outlet beside the wall switch is handy.

It's a good rule to have an outlet within 6 feet of any spot along each usable wall in the living room and bedrooms. In the dining room the distance can be 10 feet.

Wall switches are far safer and more convenient than pull chains for general lighting fixtures. The wall switch should be located by the doorway to the room—within reach as you enter or leave. If a room has two entrances more than 10 feet apart, you need switches to turn the light on or off at either door. Halls and stairways should have switches at both ends too. Switches for turning on light from two points are called three-way switches.

**In the yard and farm buildings.** Wiring in these locations is more exposed than in the house so extra precautions are needed. Both wiring and fixtures must be protected from moisture. In livestock barns there are also corrosive gases such as ammonia and hydrogen sulfide. Moisture and fumes are especially destructive to wiring and fixtures in barns during the winter when stock is closely housed.

Use noncorrosive materials such as porcelain or molded plastic boxes and composition-insulated wire. Avoid pull chains; if you must use them make sure that each one has an insulated link. See that there are no bare wires exposed and that there is proper grounding of wiring and equipment.

Outlets for portable lamps and equipment should be provided when wiring is installed. Low-wattage equipment may be used on lighting circuits, but circuits of heavier wire are needed for larger equipment.

# Lighting the farmhouse

---

Every room in the house needs over-all lighting to make it cheerful and easy to get around in. This general lighting also provides the background needed for brighter areas of light. Ceiling fixtures are the simplest way to supply general light. Without a ceiling fixture in the living room, you need enough portable lamps to light the whole room. Have at least one of these lamps controlled by a wall switch so you can turn on the light as you enter the room.

In addition to general light you need good local light wherever you must see easily and clearly: At work areas in the kitchen; over laundry tubs, ironing board, and sewing machine; at desk or study table; by chairs, sofa, and beds where sewing or reading is done. Where work areas are fixed, as they are in the kitchen, local lighting is usually supplied by installed fixtures. By furniture which may be moved to different locations in a room, portable lamps are usually used.

## Fixtures for general lighting

Light fixtures distribute light directly, indirectly, or both.

Direct fixtures send practically all the light downward. As a result, most of the light is in the lower parts of the room, shadows are sharp, and light is more glaring than light from indirect fixtures.

Indirect light is soft and comfortable. The fixtures have opaque shields to direct light to the ceiling which spreads it throughout the room. White ceilings are needed to make the most of the light; colored ceilings absorb part of it. For an equal amount of light, an indirect fixture requires higher wattage than a direct fixture.

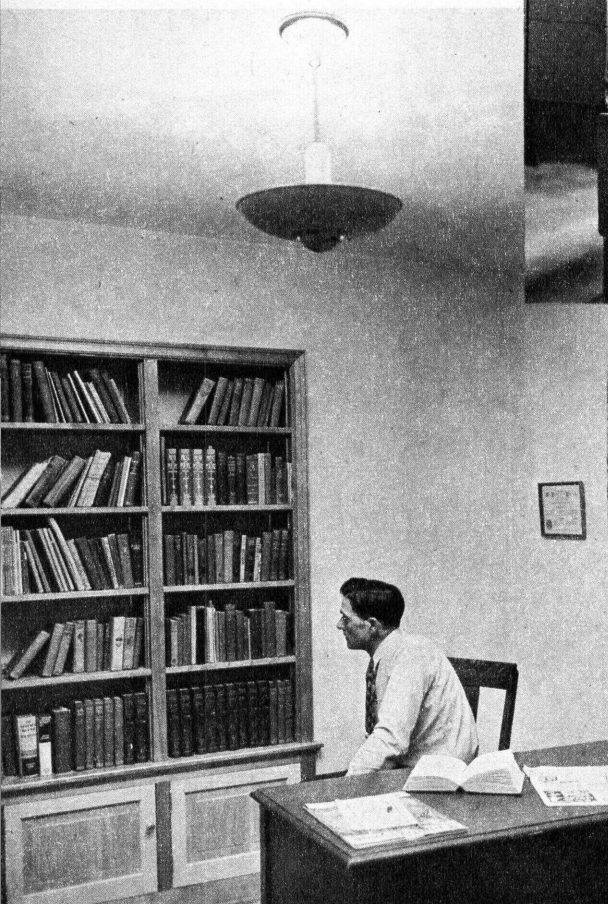
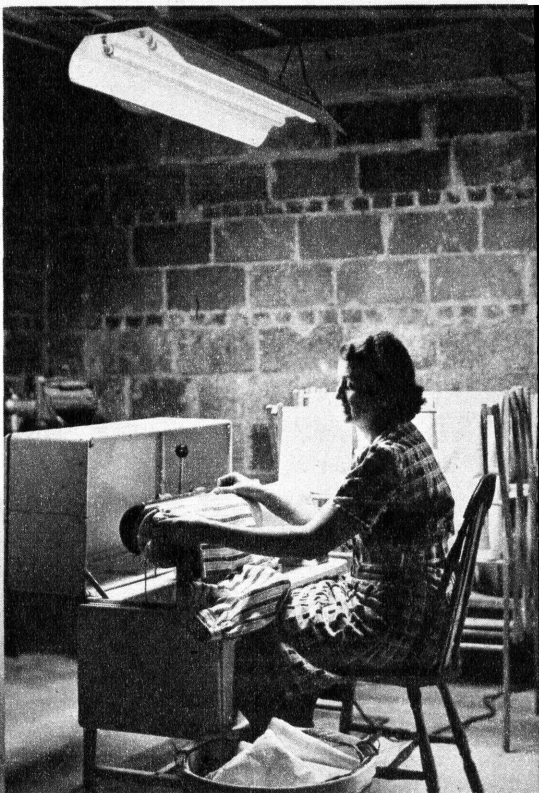
A semi-direct fixture sends a small amount of light upward; a semi-indirect one sends a little light down. Light from either is more comfortable than direct light, somewhat more efficient than indirect. With both types the ceiling should be white or very light in color.

Other special types of lighting are good for decorative purposes. Watch magazines and store displays for ideas.

The next five pages show some common types of ceiling and wall fixtures. Some are for local as well as general lighting. Most of them come in different styles and at different prices so you can choose those that suit you best. For good light follow the recommendations for use of each fixture. Be careful to select fixtures and reflecting bowls of the right size and to use the right-sized bulbs or tubes.



A direct fluorescent fixture with a white-lined metal reflector sends all the light downward. If work must be done in a basement room with dark walls and ceilings, this fixture is suitable. It does not give comfortable light for long periods of work.



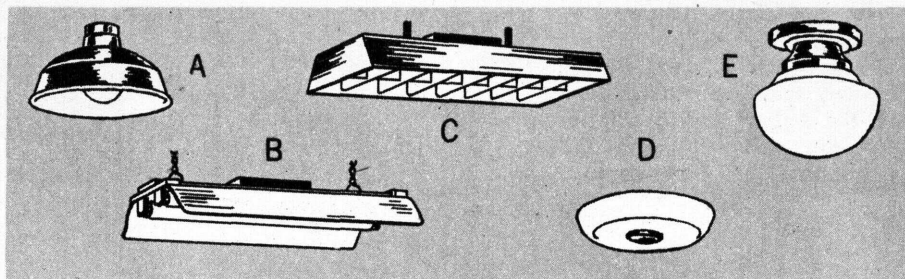
A totally indirect fixture like this one sends all its light to the ceiling to be reflected to the rest of the room. It gives soft, comfortable general light. The ceiling must be white so it will not absorb and waste light. Additional lamps are needed to provide light for close work.



This semi-direct fixture using fluorescent tubes delivers most of its light down. Clip-on louvers send a small amount to the ceiling which spreads it to the sides of the room and eliminates the dark corners.



This semi-indirect fixture has a diffusing bowl under the shade which directs the greater part of the light up to the ceiling. The downward light is directed over a definite area—in this case, a dining table. The ceiling should be white or very light in color.

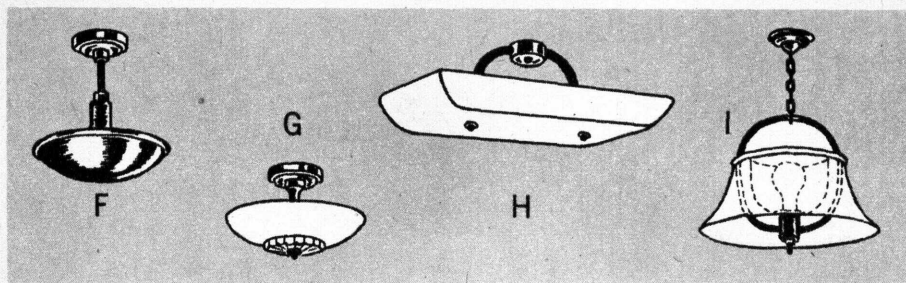


# Ceiling and

Type	Length or diameter	Recommended bulb or tube	Suitable location	Description and use
<b>A</b> Incandescent, dome reflector, direct	<i>Inches</i> 12 14	<i>Watts</i> Silvered bowl, 150 Daylight, 150	Garage, basement, attic, workbench. Over laundry tubs.	A utility fixture. Place directly over work center. To reduce harsh shadows use more than one fixture.
<b>B</b> Fluorescent, reflector, direct	24 33 36 48	Two 20's Two 25's Two 30's Two 40's	Over laundry tubs, ironer, workbench.	Gives even light over long area. Use size needed. Attach to ceiling or hang lower for more light.
<b>C</b> Fluorescent, shielded, semi-direct	24 33 48 48	*Two 20's *Two 25's *Two 40's *Four 40's	Very small kitchen. Small kitchen. Average kitchen. Large kitchen.	Side shields and cross louvers make light more comfortable. Place fixture to run long way of room.
<b>D</b> Fluorescent, circular, semi-direct	13	Circline, 32	Small kitchen or utility room; bedroom.	Use where round fixture is more desirable than a long one. Shield softens light.
<b>E</b> Incandescent, enclosing globe semi-direct	7-9 10 12 14	75 100 150 200	Basement, wash-room. Pantry, hall, bath. Kitchen, laundry. Large workroom.	Globe with clear lens in bottom is good for table lighting; globe of opaque glass gives softer light but requires larger bulb.

\*Or equivalent total wattage.

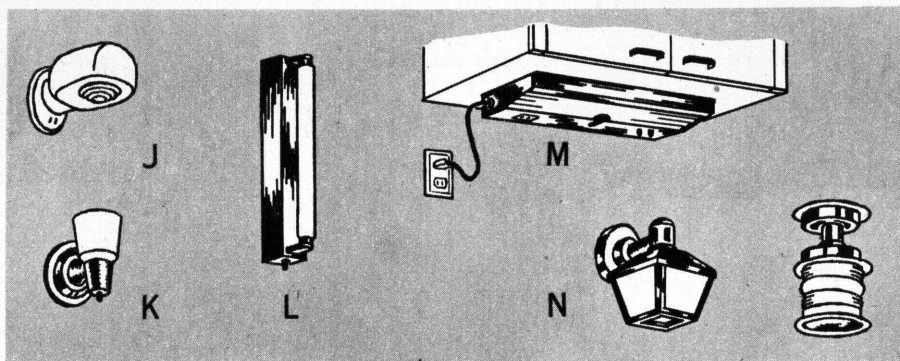




## wall fixtures

Type	Length or diameter	Recommended bulb or tube	Suitable location	Description and use
<b>F</b> Incandescent, opaque, indirect	<i>Inches</i> 12 14 16	<i>Watts</i> 100 150 200	Hall, small bedroom. Medium bedroom. Large bedroom, living room.	To be used with white or nearly white ceiling. May be designed for silvered-bowl bulb.
<b>G</b> Incandescent, shielded, semi-indirect	12 14 16 18 16	*Three 40's *Four 40's *Four or five 60's *Five or six 60's *Four 40's and one 75	Hall, small bedroom. Small living room, library, bedroom. Larger living room, library, bedroom.  Dining room.	May have a single socket but usually has several. May hang quite close to ceiling or lower. With clear glass in bottom gives good down-light for dining table.
<b>H</b> Fluorescent, shielded, semi-indirect	18 24 24	Two 15's Two 20's Four 20's	Hall, bathroom. Small bedroom. Living room, bedroom, dining room.	Small diameter of tubes permits mounting close to ceiling. Shield lets light through for good down-light.
<b>I</b> Incandescent, with diffusing bowl, semi-indirect	8 (bowl) 10 (bowl)	100 or 50-100-150 100-200-300	Small dining room. Larger dining room.	Especially good over dining table that is also used for studying. Hang it 24 to 36 inches above table.

\*Or equivalent total wattage.



## Ceiling and wall fixtures—continued

Type	Length or diameter	Recommended bulb or tube	Suitable location	Description and use
<b>J</b> Incandescent, wall bracket, semi-direct	<i>Inches</i>	<i>Watts</i> 75 or 100	Over bathroom mirror.	Shield of glass or plastic is sometimes open at top. Clear lens directs light to face. Bracket includes convenience outlet.
<b>K</b> Incandescent, wall bracket, semi-indirect		60	Both sides of bathroom mirror.	Needs shield of plastic or glass. For good under-chin lighting for shaving mount with bottom of shield about 5 feet 2 inches above the floor.
<b>L</b> Fluorescent, wall bracket, direct	18 or 24	15 or 20	Both sides of bathroom mirror.	Shield is desirable for appearance and eye comfort.
<b>M</b> Fluorescent, under-cabinet, semi-direct	18	15	Under kitchen cabinets.	To be plugged into convenience outlet. Other types come in 14-, 15-, or 20-watt sizes—some not shielded.
<b>N</b> Incandescent, weatherproof fixture		40 to 75	Porch, entry.	Frosted or etched glass reduces glare. Open bottom lights steps. If only one bracket is used, place it on lock side of door.



## Portable lamps

Portable lamps should harmonize with the other room furnishings in every way. Be sure, however, that the lamp is not only decorative, but provides sufficient illumination for your needs.

When you choose a lamp have clearly in mind what you want to use it for. Think of the area that needs to be lighted and the amount of light you will need there.

The shape of the shade determines how wide the circle of light will be. A slanting shade gives a larger lighted area than a straight-sided one of the same bottom diameter. Tall lamps give wider circles of light than shorter ones—but if they are too tall they may be too far away to furnish sufficient light on your work and the bulb may shine in the eyes of the user or of others in the room.

A lamp that sends some light up to the ceiling or lets some through the shade helps chase away heavy shadows nearby. A diffusing bowl in a lamp also helps in this respect. If the shade is of metal or thick paper that lets no light through there should always be enough general light in the room to lessen the sharp contrast of light and dark.

Any shade should be of material that prevents bulbs or diffusing bowl from showing through and deep enough to cover the bulbs and bowl. The inside of the shade should be white or almost white so it will reflect the light out where you can use it; dark-colored linings absorb the light.

For safety, a lamp should be well constructed and have a heavy enough base to prevent tipping. Lighting engineers have worked for a long time on the improvement of portable lamps. They have set up standards which guarantee ample, comfortable light and safe, sturdy construction. Lamps that carry the "certified" tag must meet these standards. (See picture at right and sketches on p. 19.) You can recognize a certified floor, table, or pin-to-wall lamp by the unusual shape of the combined diffusing bowl and reflector. The one pictured here has a circular fluorescent tube around the bowl, an incandescent bulb inside.

Common types of portable lamps are shown and described on the following pages. Note the recommended uses for each type. When selecting a lamp pay attention to its dimensions and if possible try it in a location similar to the one in which you will use it.

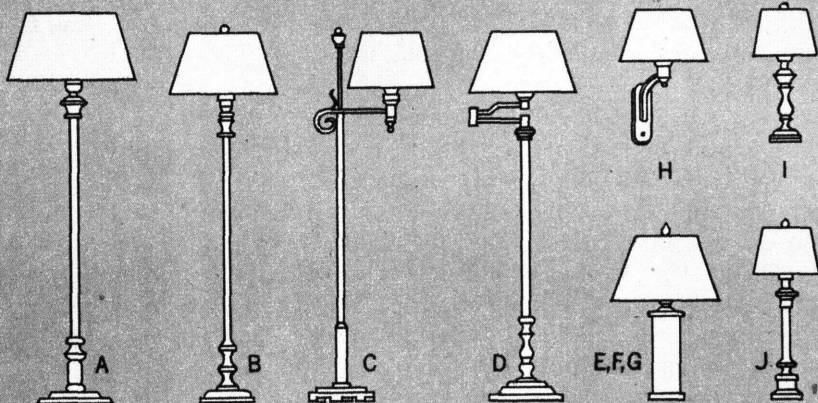


# Portable lamps

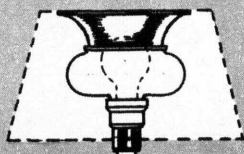
Portable lamp type	Approximate height	Shade diameter (bottom)	Correct bulb	Suitable location	Description and use
<b>A</b> Floor	Inches 59	Inches 18-19	Watts 100-200-300, 3-light.	By piano, sofa, or large chairs. Can serve two persons.	Certified lamp may also have circline tube; non-certified, candle lamps.
<b>B</b> Junior floor	56	16	50-100-150, 3-light.	Beside chair or sofa.	Gives less light than taller floor lamp. Must be closer to the user.
<b>C</b> Bridge	56	13	150 or 50-100-150, 3-light.	By sewing machine, desk, broad-armed sofa, or chair.	Lamp with diffusing bowl much better than type with turned-down bulb.
<b>D</b> Swing-arm	56	16	50-100-150, 3-light.	By sewing machine, desk, broad-armed sofa, or chair.	Good between two pieces of furniture not likely to be used at same time.
<b>E</b> Table, diffusing bowl	25-28	16	150 or 50-100-150, 3-light.	On table by bed, sofa, or chair. On desk, study table.	Choose lamp of height to give right spread of light for your purpose.
<b>F</b> Table, 2-socket	19-26	14-16	Two 60's.	On end or side table.	Often not good for close work; use for general lighting, casual seeing.
<b>G</b> Table, wide harp	25	16	White indirect.	On end or side table.	Can be made from old lamp of poorer type if tall enough. Good light.
<b>H</b> Pin-to-wall		12-13	100, 150, or 50-100-150, 3-light.	Over bed, desk, chair or sofa, kitchen sink dinette table.	Use where floor or table space is lacking. Hang it so shade shields bowl from sight of user.
<b>I</b> Dressing table	20	8-10	60, 100, or 30-70-100, 3-light.	Use in pairs; user sits at dressing table, stands at dresser.	Shades should be level with face of user. White shades are needed for natural light on face.
<b>J</b> Dresser	26	8-10			



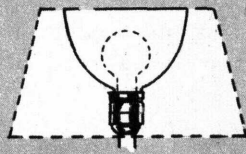
## LAMP TYPES



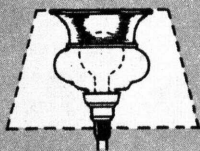
## INSIDE THE SHADE



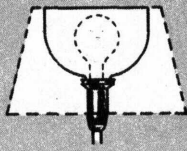
Diffusing bowl for certified lamp, type A



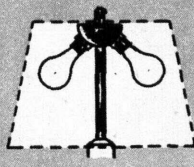
Diffusing bowl for non-certified lamp, type A



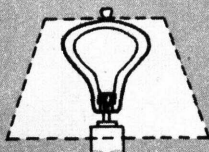
Diffusing bowl for certified lamp, types B, C, D, E, H



Diffusing bowl for noncertified lamp, types B, C, D, E, H



Two sockets for lamp, type F



Wide harp for lamp, type G



Harp with diffusing disc for certified lamp, types I, J



Clip-on shade for non-certified lamp, types I, J



**Placement of lamps.** Even the best lamps have to be well placed if they are to do a good job for you. Try holding an open book close under a lamp. Now move the book slowly downward and watch the print fade. Start again, this time moving the book sideways. This shows how important it is to keep light close to what you want to see. But the lamp should also be placed so you can be comfortable.

For writing or sewing have the lamp opposite your working hand so that your hand will not shadow your work.

Place a lamp for reading beside and toward the back of chair or sofa so light will fall on the page. The lamp will be out of your sight too.

A table lamp placed in the center of a dining table may furnish good light for children studying at the table. But if you want to sit beside the table to read, with the light coming over your shoulder, you cannot get close enough to the lamp to get good light on the page.

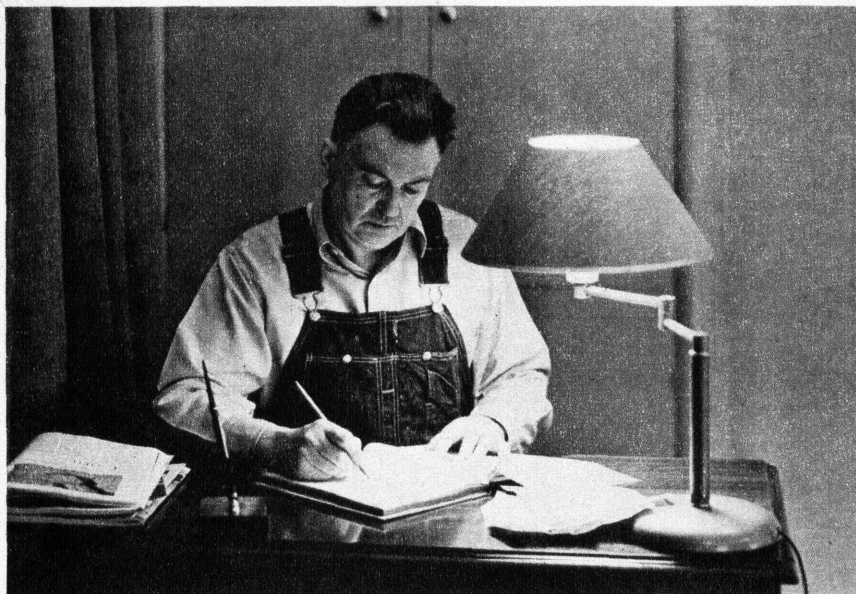
On an end table close by chair or sofa use a tall lamp if the table is low, a shorter lamp on a higher table. A short lamp on a low table may barely light the arm of the sofa or chair. An end-table lamp gives the best light when it is as high as it can be and still shade the user's eyes.

Good lamps can often be shared by two persons. Large floor lamps may be used this way and so may table lamps if placed on tables of the right height to spread light to both users, and to permit both of them to sit comfortably as they read or work.



A good lamp with a wide spread of light can serve two persons very well. Arrange lamp and chairs so there are no shadows on the page or hand work.





A desk lamp for a right-handed person should be at his left so his writing hand will not shadow its own work. The lamp should be tall enough to light the desk top with the bottom edge of the shade coming below eye level.



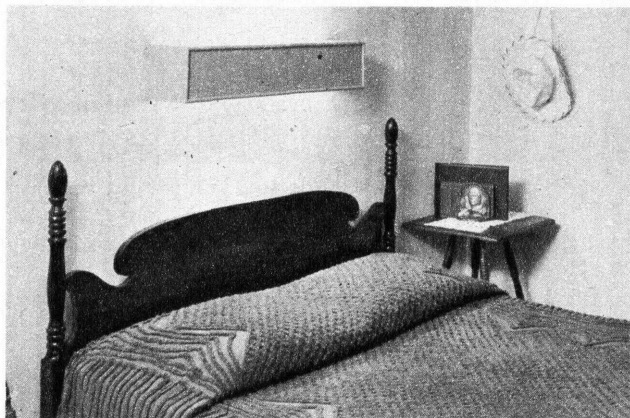
A pair of vanity lamps light both sides of the face at one time. Shades should be at face height, and white to show the skin at its true color.





A swing-arm lamp placed between the sewing machine and the chair provides light for either. Additional light on fine hand sewing can be had by clamping a reflector flood lamp to this lamp's stem.

A home-made box in which a fluorescent tube is mounted makes a good bed lamp.



A good table lamp can serve two persons if placed so its circle of light is wide enough for both. The bright diffusing bowl or shade lining should not be visible to either user. A smaller table lamp is usually adequate for only one.



A floor lamp by a piano should have a shade that lets light through and a diffusing bowl to prevent sharp reflections from the piano. Place lamp to the rear of the player so he cannot see the bright shade lining.



The small plug-in night light in the bathroom provides light enough for getting around safely, not enough to be disturbing.

## Night lights

Ordinary light turned on in the dark of night can waken sleepers and dazzle those already awake. Night lights glow and enable a person to move about safely. They use very little electricity. The simplest types can be plugged directly into convenience outlets.

## How to plan for good lighting

Whether you are planning new lighting or looking for ways to improve what you have, the place to begin is with your own needs. The chart that follows may guide you in making a plan. Study the recommendations in the second column. Underline activities in the third column that apply to your family and write in any others not listed. Then make a list of the lamps and fixtures that you need for each room.

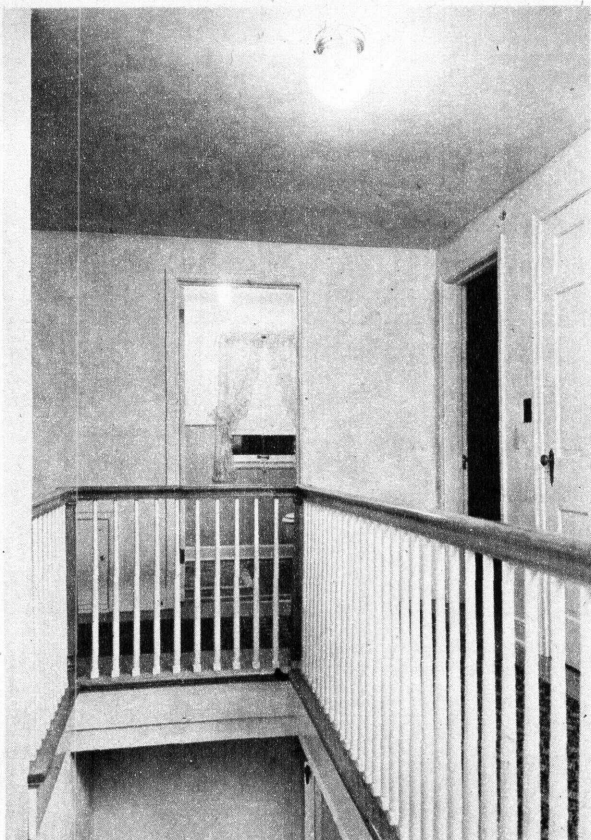
# Lighting units for

Room	Recommended fixtures and lamps
Living room	A certified lamp or lamp with diffusing bowl or white indirect bulb at each spot where reading or work is done. Two or three lamps with low light for viewing television. If room has fewer than four well distributed lamps a ceiling fixture is needed.
Dining room	A combination (semi-indirect) ceiling fixture with 100-200-300-watt bulb if table is to be used for study or close work. A shielded ceiling or drop fixture with a center down-light is all right for dining and general activities.  One or more portable lamps where needed for special activities.
Kitchen	One ceiling fixture plus others as needed for good shadow-free light at sink, range, work counters, dining area.
Bedroom	One ceiling fixture (indirect or semi-indirect). Pin-to-wall or table lamp or shielded fluorescent unit for each bed. Dresser or dressing table lamps. Floor or table lamp as needed for chair or desk.
Walk-in closet or storeroom	One ceiling fixture or wall bracket.
Bathroom	One fixture on each side of mirror. Add a ceiling fixture for a bathroom of more than 50 square feet. A fixture used over shower should be vapor-proof.
Hall and stairway	At least one ceiling fixture; two if needed to light entire stairway. Place or shield so direct light never strikes the eyes.
Laundry or workroom	One ceiling fixture plus others as needed for work centers.
Basement	One ceiling fixture or wall bracket for each room or activity center, and one ceiling fixture at stairway.
Attic	At least one ceiling fixture; more if attic is divided into rooms or alcoves.
Entrances, porches	One ceiling fixture on any porch large enough for any activity. Ceiling fixture or one or two wall brackets for any entrance. Place fixtures so steps will be lighted.

# different rooms in the home

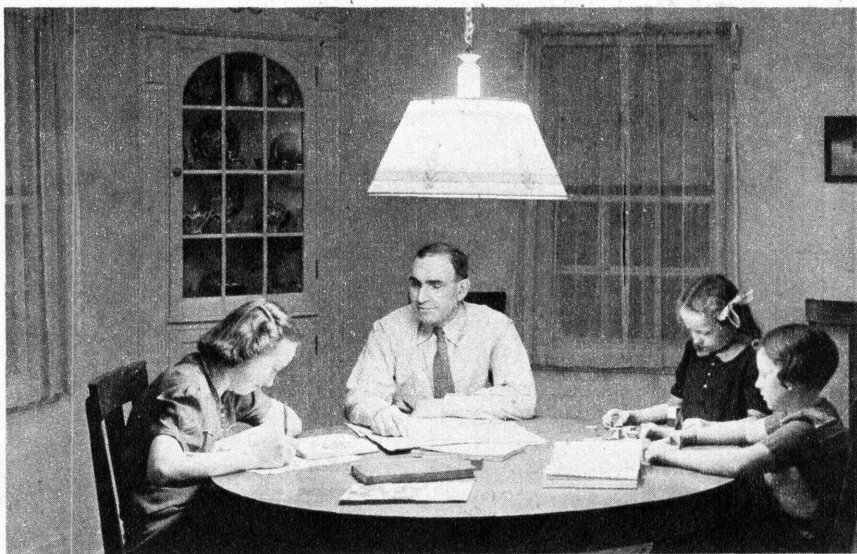
Usual activities	Activities of your family
Sewing, reading, studying, writing, playing piano, table games, active play, listening to radio, visiting, watching television.	
At table: Eating, reading, studying, writing, playing games, sewing.  In other parts of room: Sewing at machine, writing at desk.	
Preparing, cooking, serving, eating, and preserving food; washing and drying dishes; planning meals; reading recipes and instructions.	
Reading in bed, using mirror, sewing, reading in chair, working at desk, dressing, care of children, seeing into closets.	
Finding things or putting them away.	
Bathing, applying make-up, shaving, first-aid.	
Walking through.	
Washing, ironing, stain removal.	
Laundering, canning, repairing things, tending furnace, storage, play.	
Storage, play.	





Shadow-free light is needed over any stairway. A ceiling fixture in the lower hall should be shielded or placed so light does not shine directly in the eyes of a person descending the stairs.

A dining room that is used for study needs a fixture that will give good light on the table and distribute some through the rest of the room. This one has a diffusing bowl for comfortable light.





▲  
In a kitchen, light is needed around the sides of the room where work is done. This fixture has fluorescent tubes in a wooden trough that directs light into cupboards and down onto the work counters.

►  
In the bathroom, light is needed for shaving and make-up. Shielded fluorescent tubes like these light both sides of the face. They are low enough to light the entire face—even under the chin.





# How to improve your lighting

Sometimes the purchase of one good new lamp and the rearrangement of others will greatly improve your lighting. Or the replacement of a fixture or two may solve a problem. If you replace an incandescent fixture with a fluorescent one make sure that the new one is properly supported; fluorescent fixtures are usually too heavy to be merely hung from a socket as many incandescent ones are.

You may be able to improve some fixtures. Shades or shields that clip onto the bare bulbs or tubes of a ceiling fixture make light ever so much more comfortable. Larger shields, sometimes called adapters, may have supporting frames to be screwed into the sockets of single-bulb fixtures. If there isn't room for shields try silvered-bowl bulbs.

Some portable lamps can be improved quite simply as you see on the opposite page. If you can't invert a turned-down bridge lamp, use a silvered-bowl bulb; a light-reflecting disc attached to the socket is a further help. Perhaps replacing a straight shade with a spreading one will put light where you need it. A poor lamp that can't be improved had better be retired to an unimportant location.

If a shortage of outlets is limiting your use of portable lamps see if more could be added economically. There are surface wiring systems to be fastened to walls that may be less expensive than built-in outlets. They are much neater and safer than multiple plugs and loose extension cords. If you use surface wiring systems, be sure that these have the approval of the Underwriters' Laboratories—and don't use more lamps and appliances than your wiring can safely carry.

When the wiring system just can't supply all the electricity you need there is nothing to do but make additions. A good electrical contractor can help you plan how to do this most economically.

## Keeping lamps and fixtures at their best

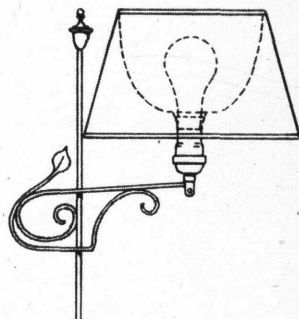
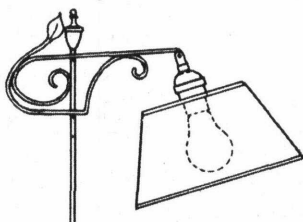
Dust on bulbs, diffusing bowls, and shades steal light. Dust them regularly as you do furniture. When bulbs and bowls need washing turn the switch off and remove them from fixture or lamp. Wash bowls like any glassware. Clean bulbs and fluorescent tubes when cool with a damp soapy cloth and wipe dry; do not immerse in water. Make sure that they—and your hands—are dry before you replace them.

When bulbs or tubes darken you are paying for light you aren't getting. Replace them with new ones. Dispose of the old ones at once before they can be broken and injure anyone. Besides the danger of cuts from broken glass there is chance of harm from materials used inside some of the earlier fluorescent tubes.

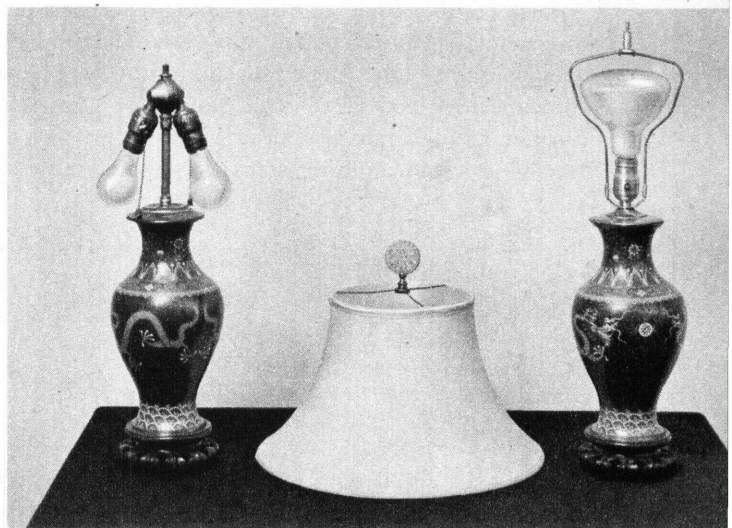
This little lamp was too low to be of much use. Set on a block of wood and given a wider shade it became a pretty good lamp.



Some turned-down bridge lamps can be made over this way. The socket is first inverted. Then a diffusing bowl and a wider shade are added. The result: a better and softer light.



The two sockets of this lamp were removed and replaced with a wide harp and white indirect bulb for more light.



# Lighting the farmyard and buildings

---

Good electric lighting in farmyards and buildings more than pays its way. It saves the farmer's time and energy by enabling him to do work just when and where it needs to be done. It makes chores safer, is a protection against prowlers and an immediate help in emergencies. Yard lighting also makes outdoor recreation possible in the evening and gives the farmstead an air of friendly hospitality.

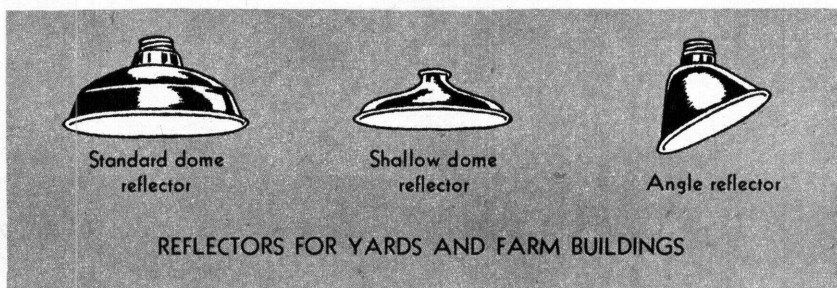
## Yard lighting

Yard lights should be so placed that all the regular chore paths between the house, farm buildings, and feeding lots are lighted.

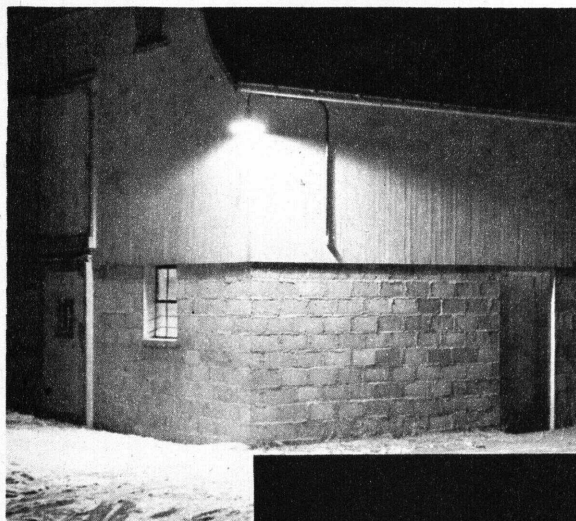
A well-located wiring pole is a good place for a lighting fixture. If the fixture is mounted on top of the pole there will be almost no shadow from the pole itself. Or a fixture may be attached to the barn, garage, or shop. For a good spread of light put the fixture about 15 feet above the ground. If it is much higher the lighted area will be wider but you will need to use a higher wattage bulb. And when the bulb must be changed you will be glad if it isn't too high.

Inside-frosted bulbs of at least 200-watt size in weatherproof reflectors are good for outdoor use. The reflectors are needed to direct light down and protect bulbs from rain, hail, and snow. Shallow dome reflectors give the widest spread of light; angle reflectors throw it in a definite direction.

In some sheltered spots—such as under eaves—you may prefer 150-watt projector flood lamps or reflector lamps made especially for outdoor use. They are good for lighting areas where machinery repairs are to be made,

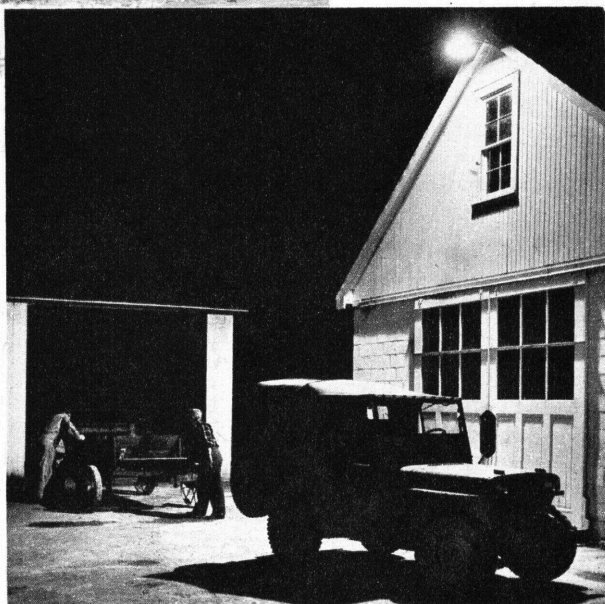






The corner of a farm building is often a good location for a lighting fixture. The light from it shines along two sides of the building and out across the farmyard.

Another possible location for a yard light is the gable of a building. Light should shine toward the other buildings, covering important chore paths.



for play yards, and for protecting poultry houses, truck gardens, vineyards, or orchards from thieves. If you use white paint on fences or buildings in the path of the light, prowlers can be seen clearly against them. Portable flood lamps (on good weatherproof extension cords, if needed) are excellent for lighting emergency jobs.

You should be able to control yard lights from different points. You may do this by three- or four-way switches or by a newer 115-volt or 18- to 24-volt remote-controlled relay method. A relay system is economical where buildings are widely scattered or where you want to turn yard lights on or off from more than two or three points.

## Light in farm buildings

In farm buildings, as in the house, you need both general light and local light.

General light enables you to move about safely without tripping or stumbling. It lights areas where livestock is housed so that animals are not surprised or alarmed by people or moving shadows. This is the light you need for the regular chores that do not require you to see detail.

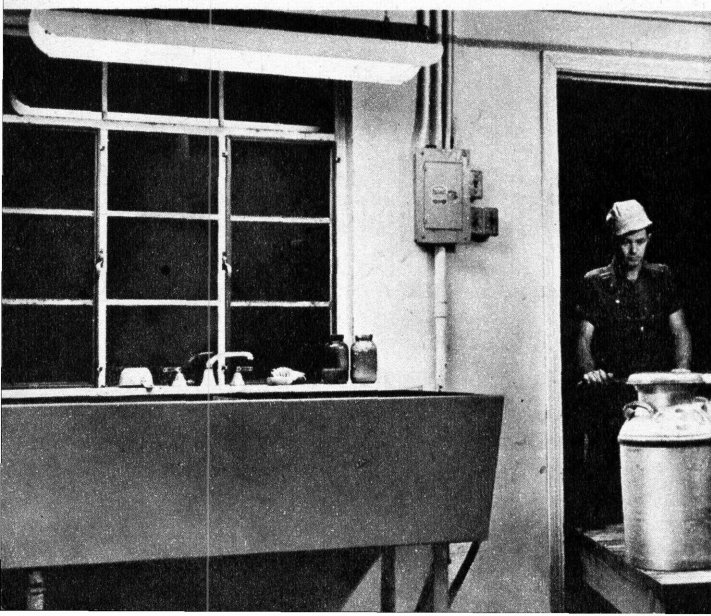
For safety, be sure that light is provided at cross alleys, hay chutes, ladders, and stairways.

For some regular chores such as care of milk and milk utensils, you need more light and light of better quality. To provide this, fixtures for local lighting, well located in relation to the special work, are needed.

For seasonal or emergency jobs—grading of fruits or vegetables, care of sick animals, or machinery repairs—you also need good local light. For the seasonal jobs always done in the same locations, installed fixtures are best, but for emergency work “rough service” lamps on heavy-duty extension cords are needed.

**Fixtures and their location.** In farm buildings with rough-surfaced, dark-colored walls and ceilings which absorb light it is best to use fixtures with reflectors to direct light down. Choose reflectors of the right shape to put light where you need it.

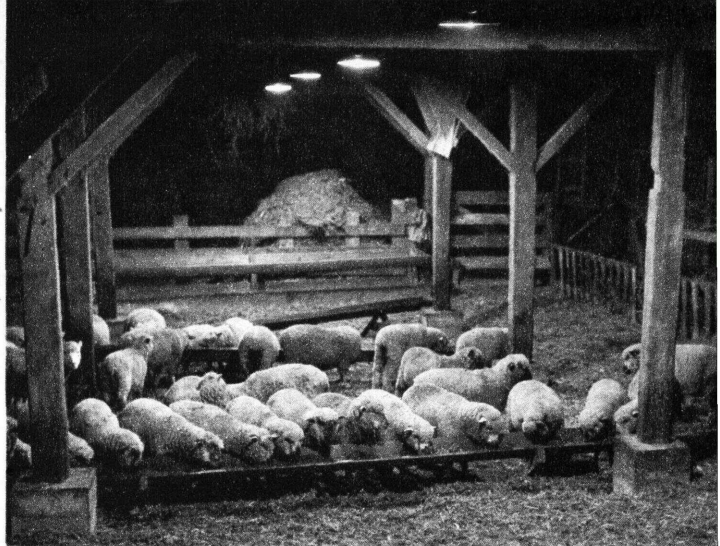
In some locations wire guards or protecting globes are needed (or required by State law) to protect bulbs from breakage or dust. In dusty places such as haymows and feed rooms, fixtures that use ordinary screw-neck fruit jars to cover bulbs are a good investment. Where guards, globes, or jars are used, reflectors are usually omitted.



Good light is needed in the milk house to make it easier to be sure that the utensils are clean. A fluorescent fixture over the washtubs is a big help. A large room will need more than one lighting fixture.



In sheep and beef cattle barns light is needed for feeding and for safety in caring for stock. Where ceilings are dark as they are in this sheep barn, reflectors can almost double the amount of useful light.



In well-finished buildings with light-colored ceilings, enclosing globes may be used—for better appearance and more diffused light.

Exposed beams, joists, posts, and girders get in the way of light. Locate fixtures to keep work areas as shadow-free as possible. A good general rule is to place ceiling fixtures no farther apart than one and one-half times their height from the floor. Provide light directly over the work area for such specific jobs as washing milk pails or grinding feed.

Electric light in farm buildings is usually needed for rather short periods so the difference in cost of electricity for low and higher wattage bulbs is hardly worth considering.

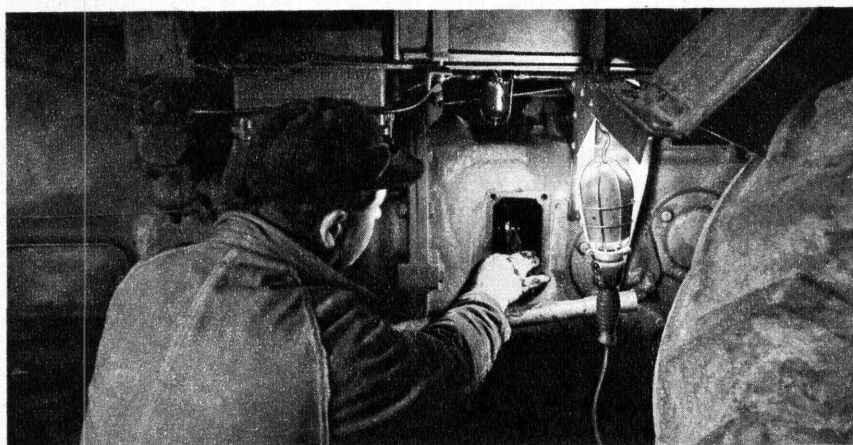
**Fluorescent lighting for farm buildings.** The light from fluorescent tubes is good in most farm buildings. It is especially good over the workbench or in the milk house where a large amount of even, shadowless light is needed.

In considering fluorescent lighting for farm buildings temperature must be taken into account. Low winter temperatures will reduce the amount of light from regular fluorescent tubes and prevent satisfactory operation. Light output drops 1 percent or more for each degree Fahrenheit below 65°. Where temperatures will be between 50° and 32° use standard tubes and fixtures with thermal type starters. For temperatures from 32° to 0° use special low-temperature tubes as well as thermal starters. At temperatures below 50° protect tubes from drafts. If used outdoors fluorescent tubes should also be protected from weather and moisture. Any enclosure for a fluorescent fixture should be ventilated to prevent overheating and damage to the equipment. Fluorescent equipment is built for use on voltages between 110 and 125. At voltages below 100, unsatisfactory operation may be expected.



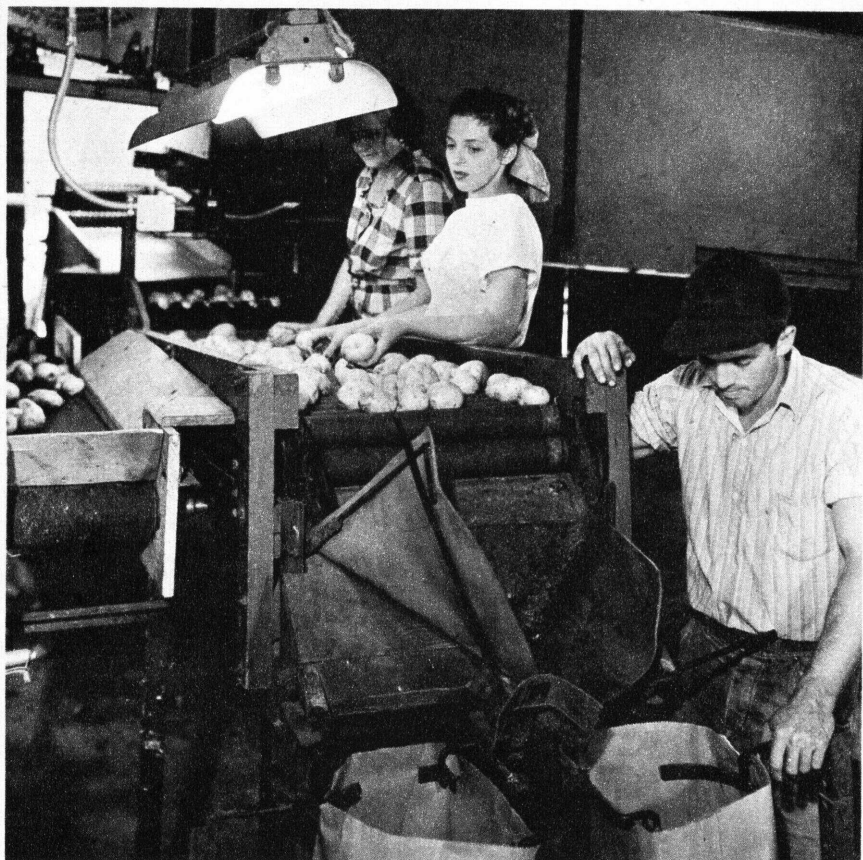


Good light over the shop bench speeds repair work and makes it easier to do.

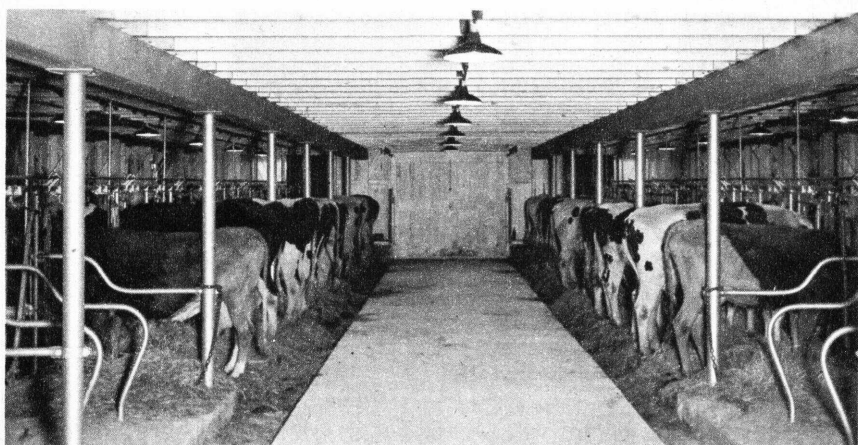


Rough service lamp, shielded to protect the eyes, is good for special jobs.





Daylight fluorescents are suitable for use over fruit and vegetable graders.



A well-lighted dairy barn has fixtures over feed alleys and down the center.



# A guide to lighting

Building	Recommended fixtures*
Dairy barn	One fixture at every third stall over single or central litter alley, every 10 to 15 feet over feed alley, and over each maternity or calf pen. In a display barn use bulbs of at least 100 watts. Fluorescents may be on 12- to 15-foot centers.
Milk house	In very small room one fixture; in larger rooms one every 10 feet. One fixture over front of washtubs, another over storage racks or cooler. "Slim-line" fluorescents may be used. Have one fixture at loading platform.
Beef cattle barns	One fixture at each intersection, hay chute, or ladder. One fixture every 15 or 20 feet over feed alley, 10 to 15 feet above floor. One fixture over each maternity, calf, hospital, or bull pen.
Horse stable	One fixture for each team stall, every two single-tie stalls, or each pair of box stalls. Mount fluorescents over partitions and at right angles to the alley. Additional lights as needed for uniform lighting of feed alley.
Sheep barn	In barns 30 feet wide or less, at least one row of fixtures on 15-foot centers. In wider barns at least two rows of fixtures. For good distribution of light, allow one fixture for each area approximately 12 feet square. One fixture in shepherd's room. In shearing room one fixture at each clipper location.
Hog house	In low houses with double rows of pens, a row of ceiling mounted fixtures over center alley, one for each pair of pens. For a single row of pens, one fixture over every other partition.
Poultry house: General  All-night lighting  Evening lighting	Mount fixtures halfway between front and rear walls of house. Adjust height so that most light falls on feed hoppers and water troughs, some on roosts and under dropping boards. Allow 1 watt for each 5 square feet.  One 10- or 15-watt bulb for each 20 square feet. Have at least two to prevent interruption if one burns out. Place over feed and water areas.  10-watt bulbs on 20-foot centers, to be used after main lighting is turned off—to encourage birds to get on the perch.
Incubator, brooder, egg rooms	One fixture for each room or area 12 feet square.

\*For general lighting use 60- to 100-watt incandescent bulbs with reflectors or fluorescent fixtures with 40-watt tubes. (Use low-temperature fluorescent where needed.) Mount fluores-

# in farm buildings

Need for light	Provisions for special needs
Feeding; cleaning, washing udders; milking; stripping milk; to see foreign objects in hay or feed.	Outlets for operation of portable milkers and clippers or heat lamps for treating udders. If feed mangers are high, place lights directly over manger edge.
Handling of milk; washing and inspection of utensils; loading.	In cold climates 250-watt heat lamps are good to warm area where worker must stand to wash pails—especially if there is no other heat.
Feeding; handling of live-stock; safety at hay chutes, ladders.	Outlets where most needed for grooming devices, heat lamps, etc. Reflector flood lamps are good for special purposes.
Safety around animals; feeding; grooming; harnessing.	Extra lights for grooming, exercising, or harnessing. Outlets where needed for grooming devices.
Feeding; care of stock; shearing.	Outlets for extension cord in shepherd's room for clippers and infrared-lamp brooders for lambs.
Feeding; cleaning; care.	Outlet for electric-lamp brooder or heat lamp for each farrowing pen. Keep heat lamps at a distance of at least 18 inches from lamp to pig.
Feeding; cleaning; culling; stimulating egg production.	Can be clock-controlled for morning lighting. Outlets on separate circuit for water warmers. Additional outside fixture if yard lights do not cover poultry house.
Stimulating egg production.	No special wiring needed. A time clock may be used.
Stimulating egg production.	Time switches or suitable alarm clock control is desirable.
All operations.	Outlets for egg candlers or lamp brooders.

cent fixtures to run lengthwise over central or feed alleys, at right angles to workers' arms for close-up work areas.



# A guide to lighting

Building	Recommended fixtures*
<b>Feed and mixing room</b>	In a small room one ceiling fixture over grinder or scale. In larger room, fixtures on 10- to 15-foot centers, one over grinder, another over scale. With incandescent bulbs use dustproof fixtures to reduce danger of fire and explosion. Fluorescent is good because it does not produce much heat.
<b>Silo and chute</b>	In a 40- or 50-foot high silo one dome reflector with 100-watt bulb or 150-watt reflector flood lamp at top of chute near silo doorway. Additional lamp at bottom of chute is desirable; if controlled by the same switch it serves as a pilot to show when upper lamp is on.
<b>Haymow</b>	In average-sized gambrel- or hip-roofed barn, a pair of fixtures at opposite sides with light directed toward center. In long barns additional fixtures as needed. Place fixtures far enough from hay track so they will not be hit in handling hay and at least 6 feet away from stored hay. Provide glareless or shielded light over chute and stairway or ladder.
<b>Garage</b>	One or two fixtures, depending on size of garage. There should be one fixture for every 200 square feet of floor space.
<b>Farm shop and machine shed</b>	One fixture for every 200 square feet of floor space. In addition one 100-watt bulb in shallow dome reflector over every permanently placed shop machine and every 8 to 10 feet of workbench; or single or double tube 40-watt fluorescent fixtures on 10- to 15-foot centers. Place fixtures high enough for headroom for worker.
<b>Tobacco stripping room</b>	Use two-tube fluorescent fixtures with 40-watt tubes—one daylight and one 4500° white. Or use combination of daylight and regular incandescent bulbs. (Not as good as fluorescent.) Regular tubes or bulbs alone are not satisfactory. Provide ample light for each operator.
<b>Fruit or vegetable rooms</b>	Same as for tobacco stripping room or use daylight lamps. Place over graders or packing benches. In storage rooms place fixtures every 10 to 12 feet over aisles. In refrigerated rooms use vapor-seal fixtures and wiring; if fluorescent is used it should be the low-temperature type.
<b>Fuel sheds</b>	Use vapor-proof fixtures, located as needed, with explosion-proof wall switch.
<b>Pump house, outhouse, woodshed</b>	One fixture with 60-watt bulb.

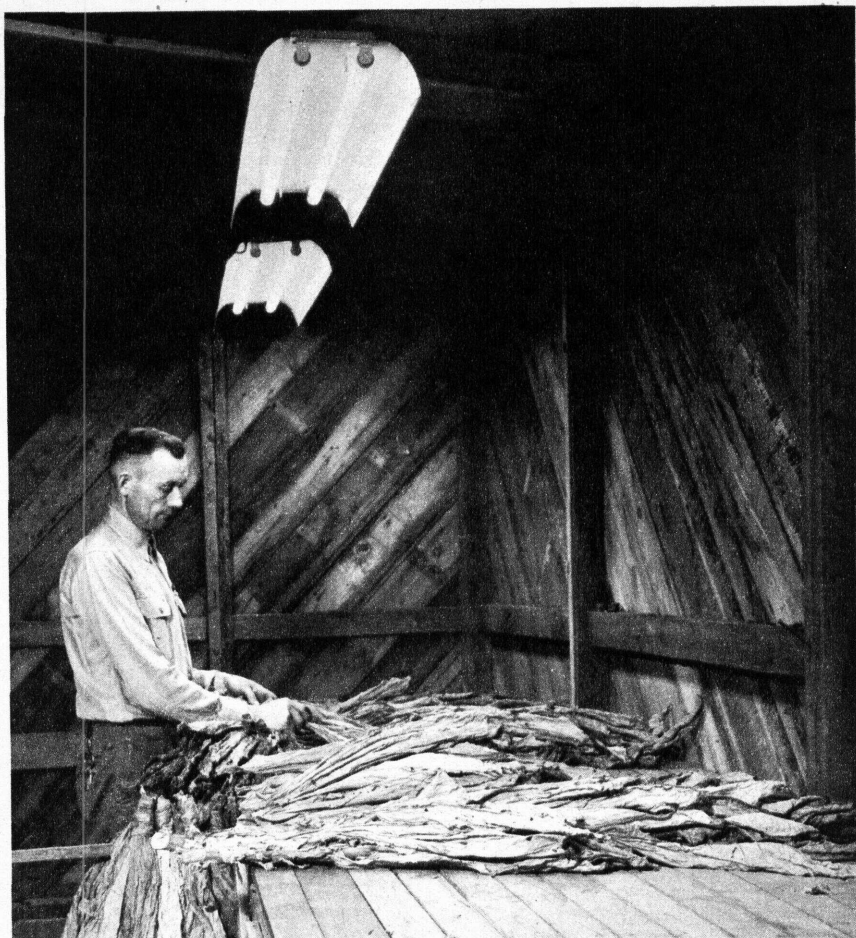
\*For general lighting use 60- to 100-watt incandescent bulbs with reflectors or fluorescent fixtures with 40-watt tubes. (Use low-temperature fluorescent where needed.) Mount fluo-

# in farm buildings—continued

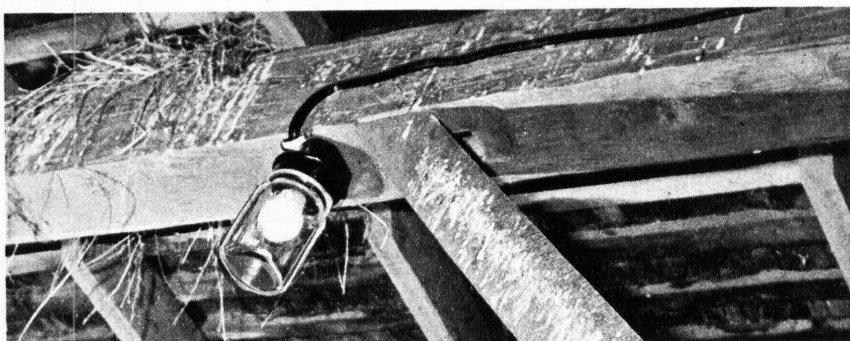
Need for light	Provisions for special needs
Handling of feed; safe operation of grinders.	Lighting fixtures may be controlled by explosion-proof or mercury wall switches for additional protection.
Safety of worker; handling of silage; seeing spoiled silage.	In high silos or those of large diameter, a portable lamp on a safety cord may be mounted on a reel or plugged into convenience outlets in the chute.
Safety of worker; handling of hay.	Provide dustproof fixtures or wire guards for lamps, especially where chopped hay is stored (required in some States). Place control switches for haymow lights at foot of ladder or stairs.
Working on car or truck.	A double convenience outlet for portable lamp or electric tool.
Maintenance; repair; construction.	Provide a 60- or 75-watt rough service trouble lamp, and outlet for it; spotlights for special machine jobs. In an unheated shop, mount a board with three sockets, 4 to 6 feet above bench, for heat lamps to keep hands warm.
Stripping, grading. Right color quality in light is essential for accurate tobacco grading.	
Washing; grading; packing; displaying.	
Storage of fuels and combustibles.	
Safety.	Outlet in pump house for use of heat lamp or radiant heater as protection against freezing.

rescent fixtures to run lengthwise over central or feed alleys, at right angles to workers' arms for close-up work areas.





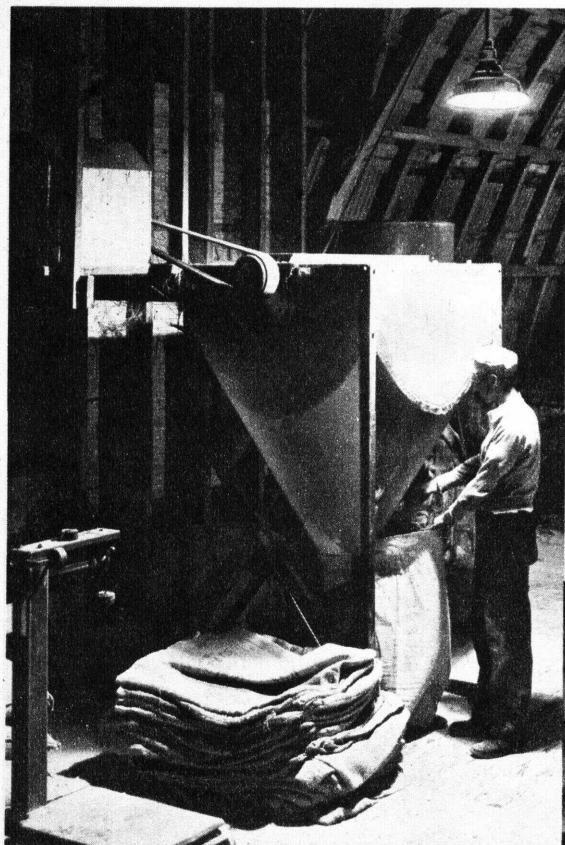
A combination of daylight and 4500° white fluorescent tubes in each fixture gives light of the color quality needed for stripping and grading tobacco.



In this haymow a glass fruit jar protects the bulb from breakage and dust.

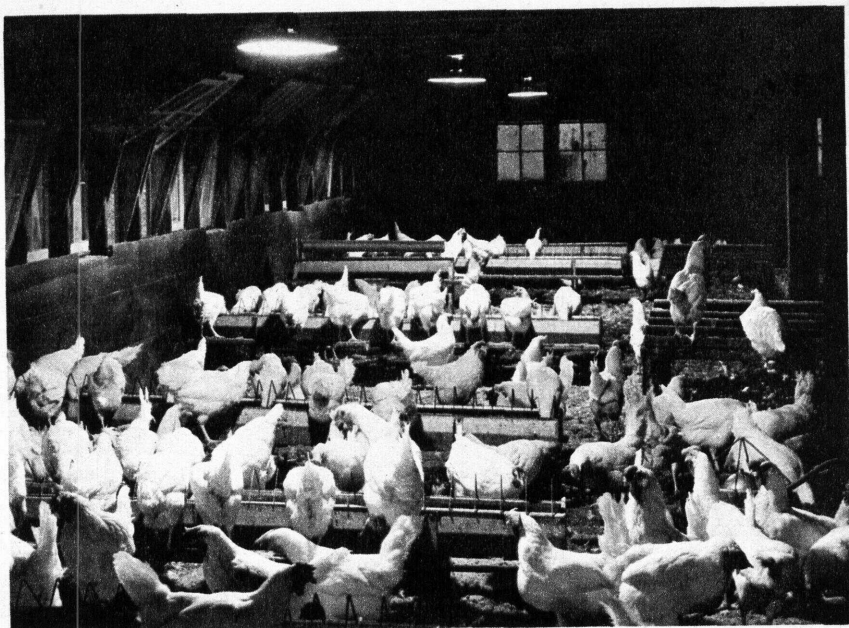


A feed grinder needs to be well lighted for safe operation. Because of the dust an incandescent fixture for such a location is better if it is dustproof. In a large feed room additional fixtures are needed for general lighting and for the scale.

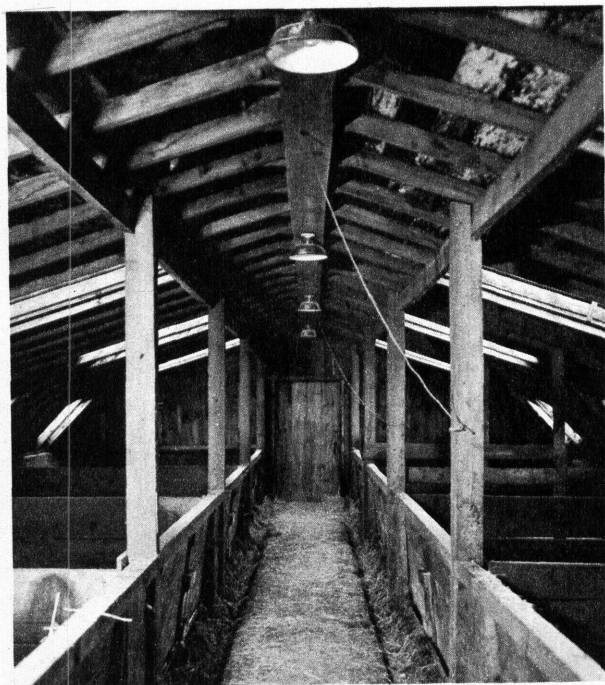


Here, light for the hay or feed chute is provided by a reflector with bulb. All bulbs used in haymows should be kept at least 6 feet away from hay and at a safe distance from the hay track.





Shallow reflectors in a poultry house direct light on feeders and waterers.



A low-roofed hog house with double row of pens lighted by a row of fixtures mounted on the ceiling over the center alley.





A large-wattage bulb in a reflector gives the needed light for egg grading.

## Care and upkeep

Because so much of the wiring in farm buildings is exposed it should be carefully watched and kept in the best repair. Failure to do so can result in shock to people or animals or fire in buildings. For safety, use heavy-duty rubber-covered wire for extension cords in farm buildings and yards.

See that fixtures and switches are kept tight, wires securely anchored, and the system well grounded. Ground motors on such equipment as gutter cleaners, pumps, and milking machines. Watch for damaged insulation and repair immediately with rubber tape and friction tape.

Do not leave sockets empty lest cobwebs or dust collect in them and possibly cause a short circuit.

# Special lamps for special purposes

---

Though not strictly for lighting, there are several special lamps that have interesting applications to farm use. They are described briefly here. For further information watch for results of experimental studies, keeping in mind that for the same results you must have similar conditions.

## Bactericidal lamps

Bactericidal lamps produce ultraviolet rays which kill bacteria. They are used by industry in walk-in coolers, meat-packing houses, and places where drugs are produced or handled, to aid in the sanitation of products and to protect the health of employees.

The application of these lamps to farm sanitation is being studied in laboratories and on farms with some favorable results. Farmers are using them in poultry houses, dairy barns, milk houses, brooder rooms, and broiler houses to improve sanitation and combat harmful air-borne bacteria.

Some bactericidal lamps are similar in size and shape to fluorescent tubes and come in 15-, 18-, and 30-watt sizes. Where temperatures are below 40° F.—as in refrigerated areas or in some farm buildings in winter—ultraviolet output of lamps is less and additional units or those of special design are necessary for adequate results. Services of design engineers are recommended for such installations.

To be effective there must be enough bactericidal lamps so the rays fully cover the room. Manufacturers make recommendations as to location and number needed. A general recommendation is one 30-watt or two 15- or 18-watt lamps for every 100 square feet. Dust in the air or anything that blocks the light rays hampers their effectiveness.

In food storage rooms and cellars, bactericidal lamps may be used to reduce the formation of molds. For this purpose lamps must be so located that the light falls directly on the food. (However, butter and leafy vegetables should be covered.) For general use it takes one 15- or 18-watt lamp for each 40 square feet of floor area.

These lamps are being used in many locker-plant refrigerators. Though correct operation of the cooler or holding room will keep meat in good condition and permit proper aging, bactericidal lamps will afford added protection. They should never be used as a substitute for good sanitation and proper handling of meat.

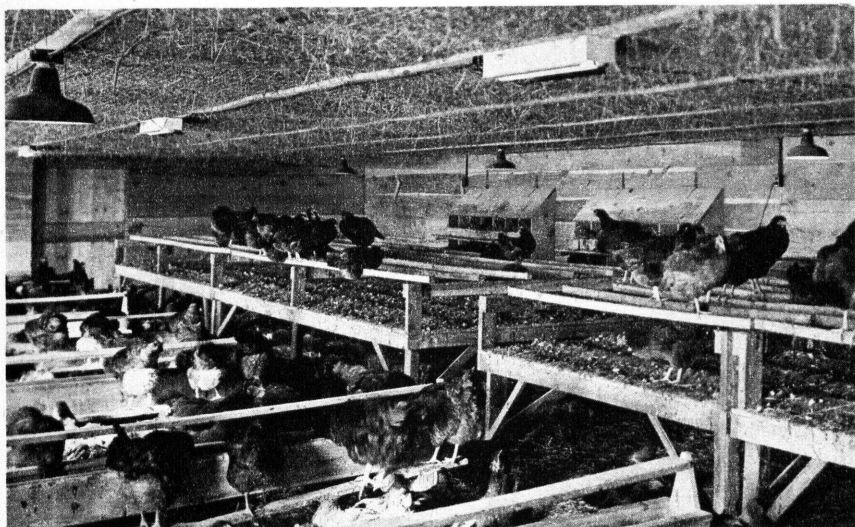


Eyes of human beings and livestock must be protected from the direct ultraviolet rays or extreme eye soreness may result. The lamps should always be shielded or placed above the eye level of poultry or livestock. A switch should be provided at the door of the room so that the worker can turn off the bactericidal lamps before he enters. Or eye shields for the worker may be kept at the door.

## Sunlamps

Sunlamps are ultraviolet lamps too. The rays that they produce tan the skin and stimulate generation of vitamin D. Sunlamps are used mainly to make up the lack of sunlight in winter months. In the house regular portable sunlamps are often used, or the RS sunlamp bulb may be used in any conveniently located socket. Directions for use should always be followed carefully.

Sunlamps are beneficial to poultry and livestock since vitamin D is essential to their health, growth, and fertility. Several State experiment stations have been studying the effect of sunlamps on poultry. Results have shown that the vitamin D required for laying hens and growing chicks can be obtained as successfully by use of S-4 sunlamps as by adding cod liver oil to feed. The lamps are used 2 to 4 hours a day. It is generally recommended that sunlamps be mounted from 3 to 5 feet above feed hoppers.



In this house for laying hens, 20-watt fluorescent sunlamps are being used. The lamps are spaced 15 feet apart to give good distribution of ultraviolet rays. These sunlamps and regular fluorescent lamps look very much alike.

The S-4 sunlamp as well as other bulb types—the S-1, S-2, and RS-4—are being largely replaced by the newer RS and fluorescent sunlamps. The fluorescent ones cost less to buy and operate. Manufacturers recommend that 20-watt fluorescent sunlamps be mounted 5 feet above feed troughs and used 5 hours per day. Operation may be clock-controlled.

## Heat Lamps

Heat lamps produce infrared rays. In the house they may give comfort to tired or aching muscles or they may be used for drying hair, melting grease in sink drains, thawing frozen pipes.

In farm buildings heat lamps are useful for drying paint on metal, warming cold motors, drying newborn livestock, treating animals, providing heat for chick or small-animal brooders. Over washtubs in the milk house or over the shop bench they supply heat to warm the worker. Over livestock waterers they keep ice from forming.

For regular use the lamps can be placed in installed fixtures or sockets, but for many purposes they are more convenient if portable.

Heat lamps come in standard or hard glass. The hard glass is less subject to damage from splashed water or moisture. Protect lamps from moisture, from weather, or contact with animals. Keep them away from litter or other combustible material that might be set on fire.

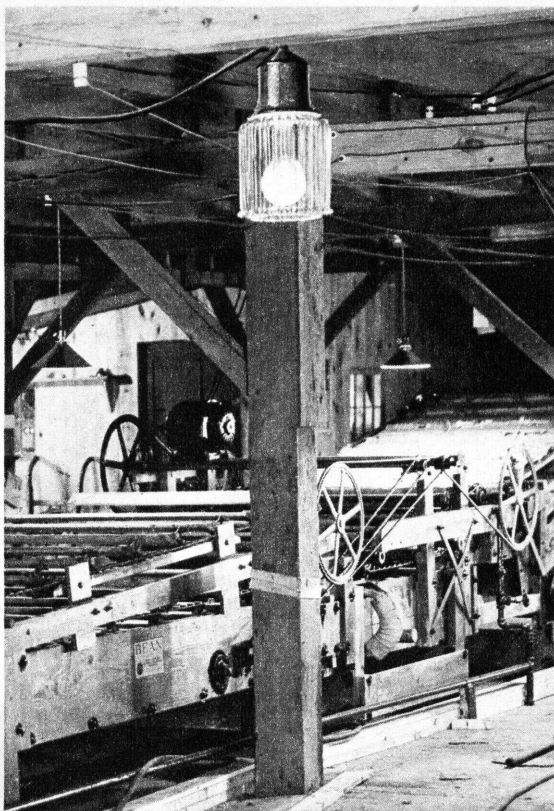
## Lamps to attract insects

Since light shining in darkness or semidarkness attracts many flying insects it can be used to ensnare some destructive ones such as moths of the European corn borer, codling moth, and hornworm that fly at twilight or in the early morning. Trapping female moths that have not yet laid their eggs may be helpful in reducing the number of crop-infesting worms they produce.

Studies show that light in the near ultraviolet region is most attractive to the corn borer moth. A fluorescent lamp "360 BL" (black light) is of this type. Further studies are being made to determine whether the corn borer can be controlled on a practical scale by the use of electric lamps and traps.

An electric insect trap with incandescent bulb can attract and destroy 98 percent or more of the codling moths wintered in packing sheds. To make most effective use of the trap all other lights in the packing shed are kept turned off. Also, the shed must be enclosed with muslin to prevent the moths from spreading to nearby orchards.

An electric insect trap with incandescent bulb in a fruit packing shed for control of the codling moth. Shed is entirely enclosed in muslin.



An infrared heat lamp provides the warmth needed by newborn pigs. Keep lamp at least 18 inches from the pigs.

